

MERRITT &amp; HARRIS, INC.

NEW YORK • LOS ANGELES • DALLAS • SOUTH FLORIDA

Consultants to the Real Estate Lending and Investment Community since 1937

20-251E

September 12, 2003

Dr. William Pitts  
National Institute of Standards & Technology  
100 Bureau Drive-Mail Stop 8662  
Gaithersburg, MD 20899-3571

Re: **World Trade Center**  
**New York, New York**

Please borrow the  
copies that were made  
at NIST so the  
original does not  
get overused.  
Thank you.

Dear Dr. Pitts:

Transmitted herewith is a complete set of the Merritt & Harris, Inc. photographs included in our Report 20-251E as requested by Mr. Harold Nelson. Permission for this release was granted by Mr. Frank Lombardi of the Port Authority of New York and New Jersey.

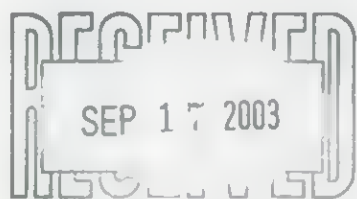
Very truly yours,

MERRITT &amp; HARRIS, INC.

  
Robert G. Weiland, R.A.  
Vice President

cc: Port Authority of New York and New Jersey  
Attn: Saroj Bhol with Photographs  
Attn: Frank Lombardi - Transmittal Only

x



-----  
WTCL Repository

One World Trade Center

World Trade Center  
New York, New York



Photograph 1

Front plaza level  
entrance (east)

X



Photograph 2

West Street Entrance  
to Lobby





Photograph 3

Rooftop and antenna

X



Photograph 4

Antenna



One World Trade Center

World Trade Center  
New York, New York

**Photograph 5**

Window washing rig



X

**Photograph 6**

Typical setback at  
MER levels







One World Trade Center

World Trade Center  
New York, New York



Photograph 7

Lobby with plaza  
level mezzanine  
above

X



Photograph 8

Lobby and elevator  
banks





Photograph 9

Lobby entrance  
from mall, and  
escalators to  
mezzanine

X



Photograph 10

Lobby entrance and  
vestibule on West  
Street





**Photograph 11**

Lobby suspended  
plaster ceiling panels



**Photograph 12**

Typical multi-  
tenanted floor  
corridor

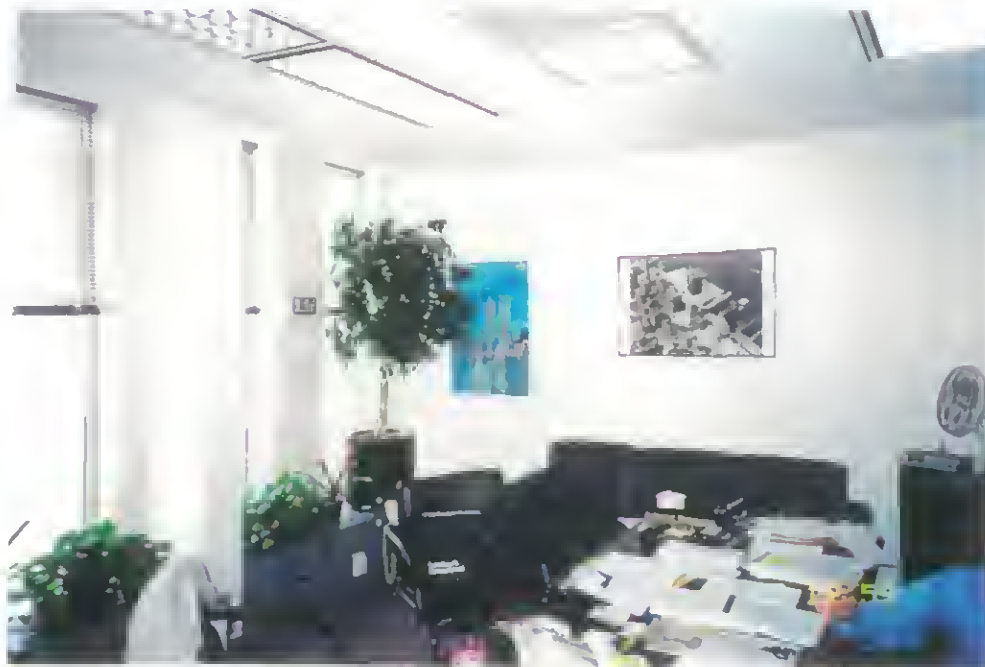




Photograph 13

Typical multi-  
tenanted floor  
elevator vestibule

XX



Photograph 14

Typical office

123

123

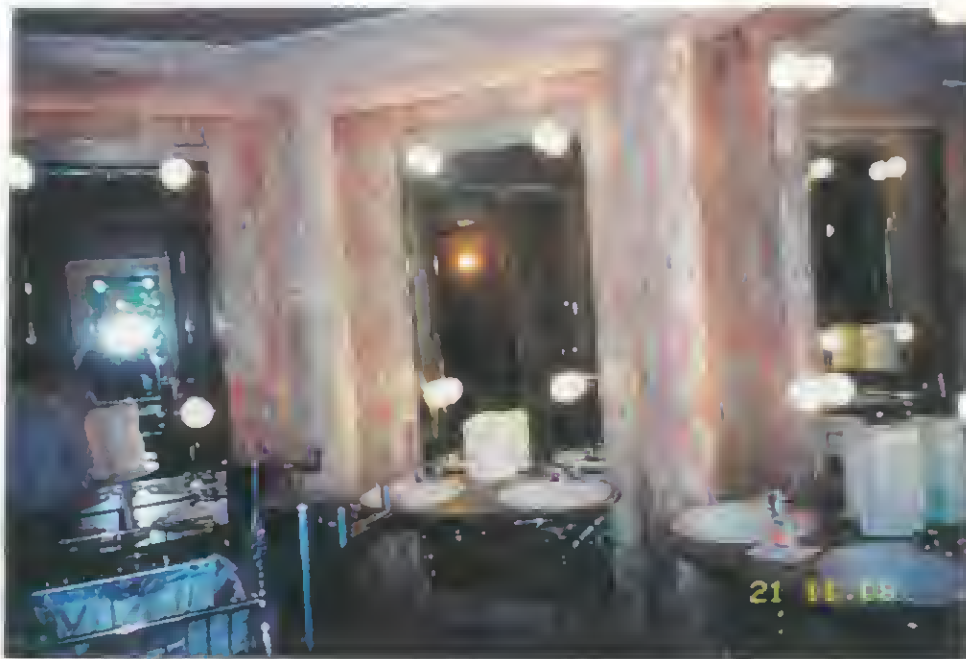




Photograph 15

Vacant space

✕

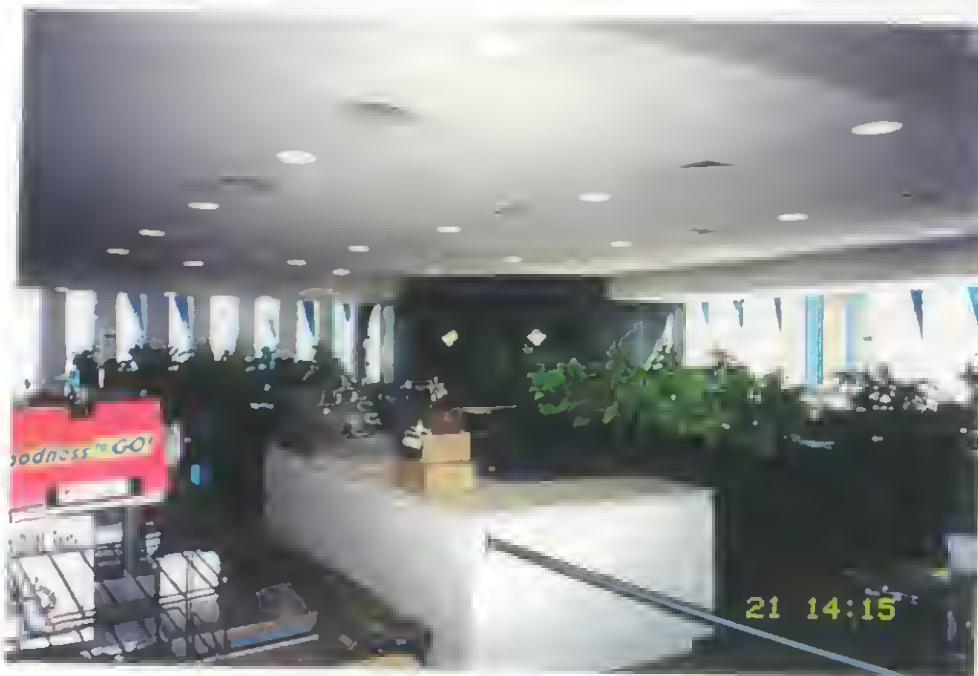


Photograph 16

Windows on the  
World rest room

122

122



Photograph 17

Port Authority  
Cafeteria on 43rd  
floor

X



Photograph 18

Port Authority  
Cafeteria on 43rd  
floor



Photograph 19

Upgraded toilet  
room



X

Photograph 20

Elevator vestibule  
Level B3 for garage



120

170



Photograph 21

Bent stair nosing on  
wide stairs.

XX



Photograph 22

Viscoelastic damper  
at each floor joist.

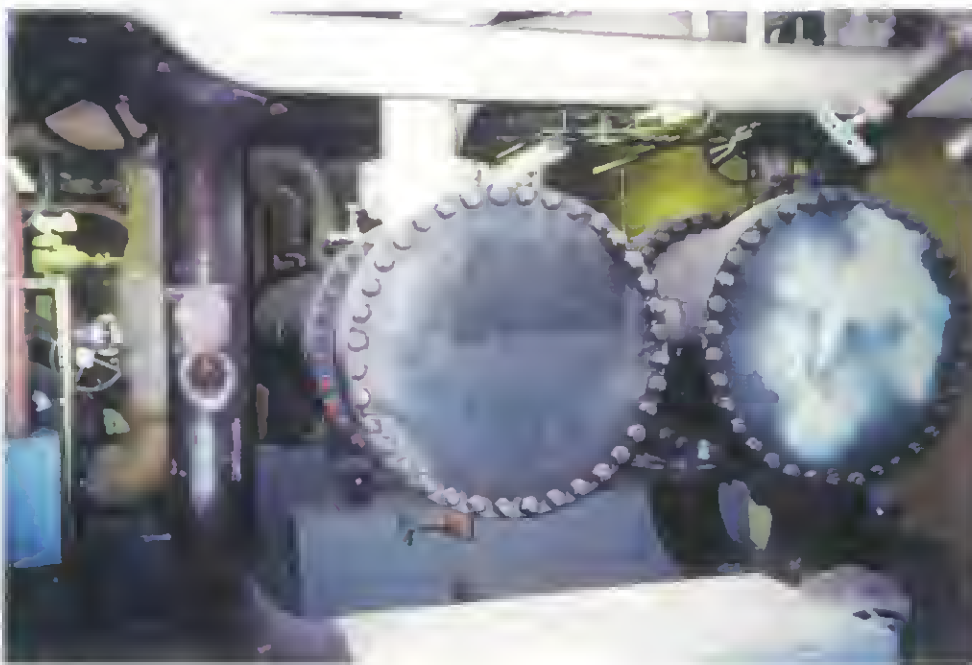






Photograph M1

Condenser water  
system #2 pump



Photograph 2

Condenser water  
system #2 heat  
exchangers





**Photograph M3**

New condenser  
water system #2  
pump and plate  
and frame heat  
exchanger

X



**Photograph M4**

New freeze  
protection  
system chilled  
water pumps



Photograph M5

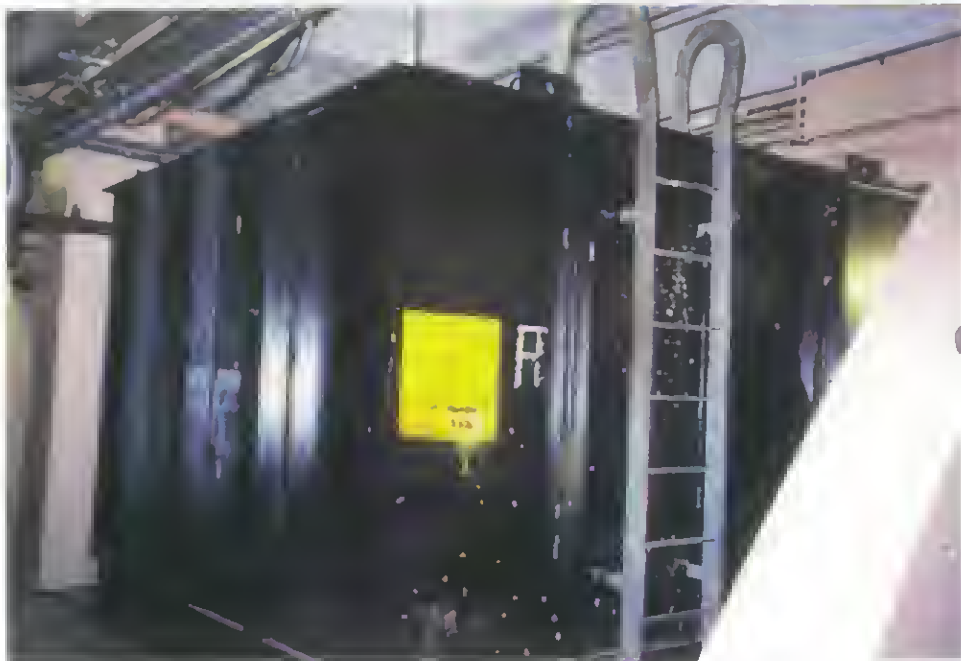
480 volt and 208  
volt electric bus  
duct risers  
located in a  
typical electric  
closet



X

Photograph M6

5,000 gal.  
standpipe fire  
reserve tank







**Photograph M7**

Typical floor  
sprinkler control  
valve room with  
sprinkler supply  
line and flow and  
tamper switches

X



**Photograph M8**

Standpipe riser  
with a fire hose  
rack, and fire  
extinguisher  
cabinet located  
in the stairs







PhotographM9

Typical office  
floor corridor  
with an exit sign,  
manual pull  
station, fire  
warden station,  
and audio/visual  
alarm

X





Photograph 1

Liberty Street  
elevation

X



Photograph 2

Liberty Street  
entrance to Lobby



Two World Trade Center

World Trade Center  
New York, New York



Photograph 3

Plaza elevation,  
Marriott hotel in  
background

X



Photograph 4

Rooftop observation  
deck, window  
washing rig





Photograph 5

Entrance to rooftop  
observation deck;  
note concrete  
covered roof

X



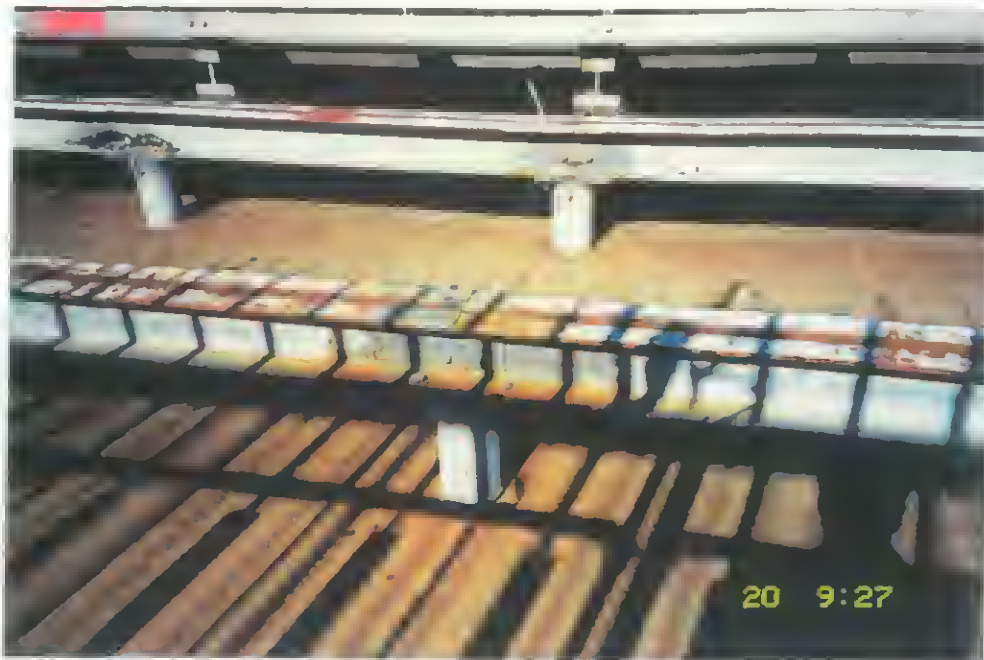
Photograph 6

Helicopter pad

111

111





Photograph 7

Rusted window  
washing rig rails

X



Photograph 8

Rusting purlins for  
exposed facade at  
110-story and at  
roof

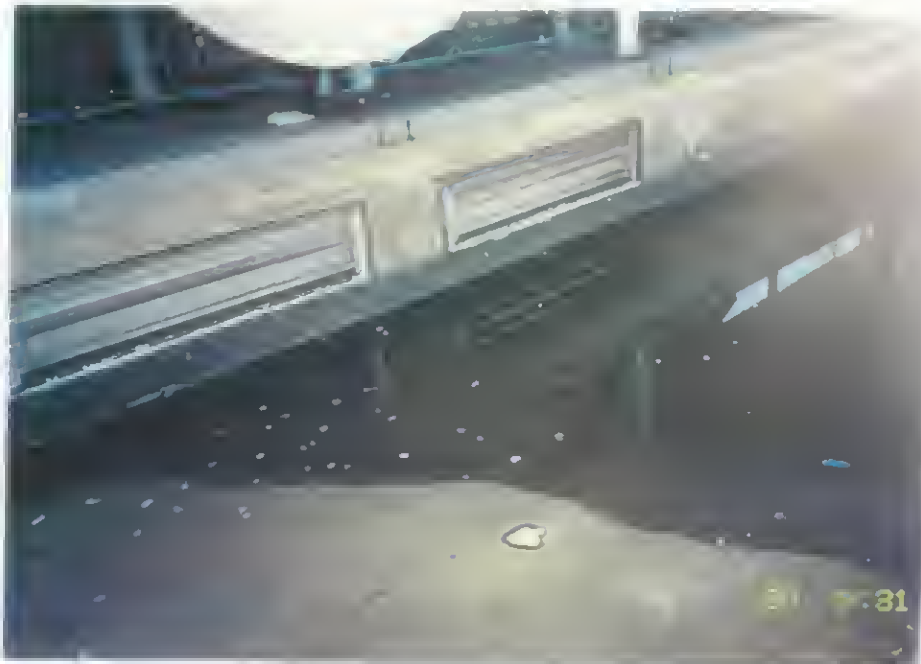


Two World Trade Center

World Trade Center  
New York, New York

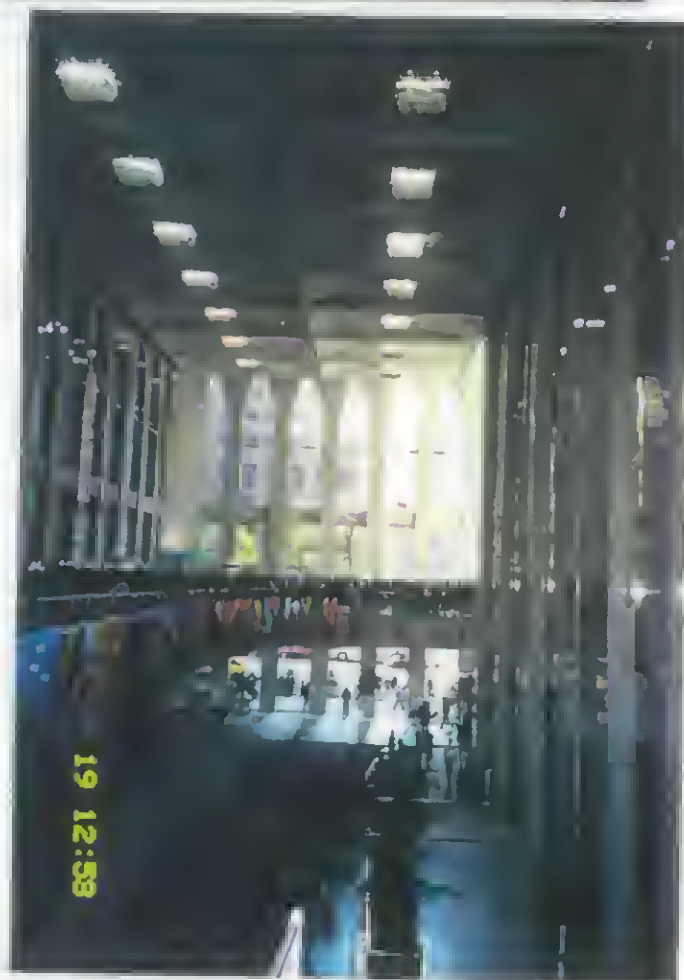
Photograph 9

Puddles at main roof  
indicate poor  
drainage



Photograph 10

Lobby and  
mezzanine







Photograph 11

Lobby - visitors desk  
on left, security gates  
to elevators on right

X



Photograph 12

Lobby, secured  
entrance to elevators  
to garage on right





Photograph 13

Vacated desks in  
lobby

X



Photograph 14

Lobby and vestibule  
entrance from  
Liberty Street







Photograph 15

ADA accessible  
entrance from mall

X



Photograph 16

Typical sky lobby





Photograph 17

Typical multi-tenant  
elevator vestibule

X



Photograph 18

Typical toilet room  
with original finishes

105

105



Photograph 19

Observation deck  
cafeteria

X



Photograph 20

Observation deck  
eating area





Photograph 21

Typical floor office  
interior

X



Photograph 22

Viscoelastic damper  
at each floor joist







Photograph 23

Typical floor  
framing system after  
fireproofing  
respraying

X



Photograph 24

Upgraded elevator  
lobby, by tenant

102

102



**Photograph M1**

Typical 7th floor  
mechanical room air  
handler and  
abandoned freeze  
protection pump  
system

X



**Photograph M2**

New air handling  
unit for the  
electrical  
substation on the  
74th floor





Photograph M3

Steam pressure  
reducing station

X



Photograph M4

Steam and  
chilled water  
heat exchangers  
and secondary  
heating/chilled  
water pumps

100

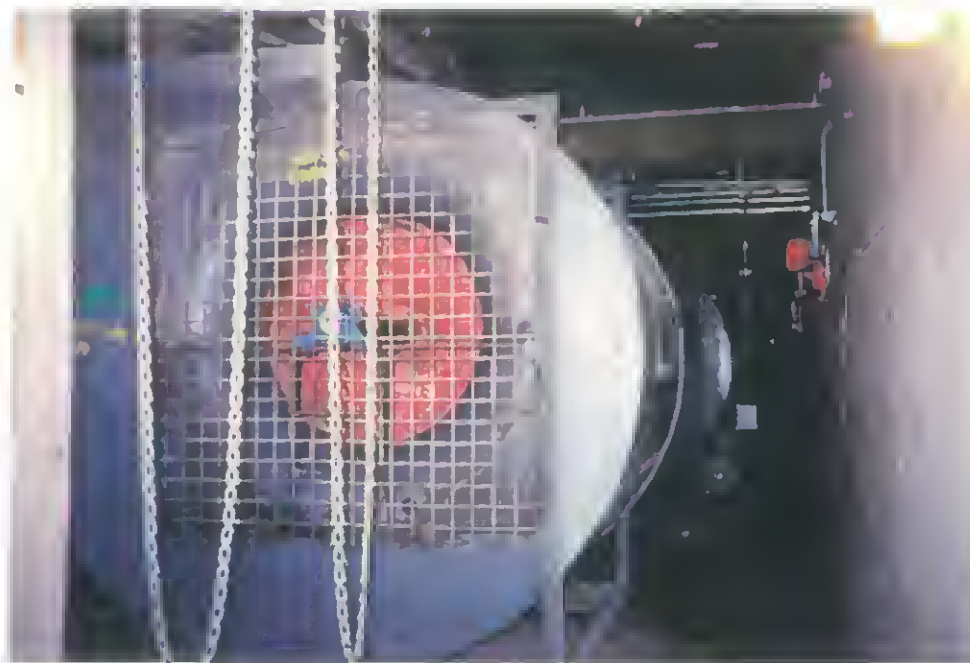
100



Photograph M5

Steam  
condensate  
return pumps  
and receiver in  
the B-6 Level  
mechanical room

X



Photograph M6

7th floor  
mechanical room  
air handler  
return air fan

99

99





**Photograph M7**

New H&V units,  
with steam coils,  
located in the B-6  
Level mechanical  
room

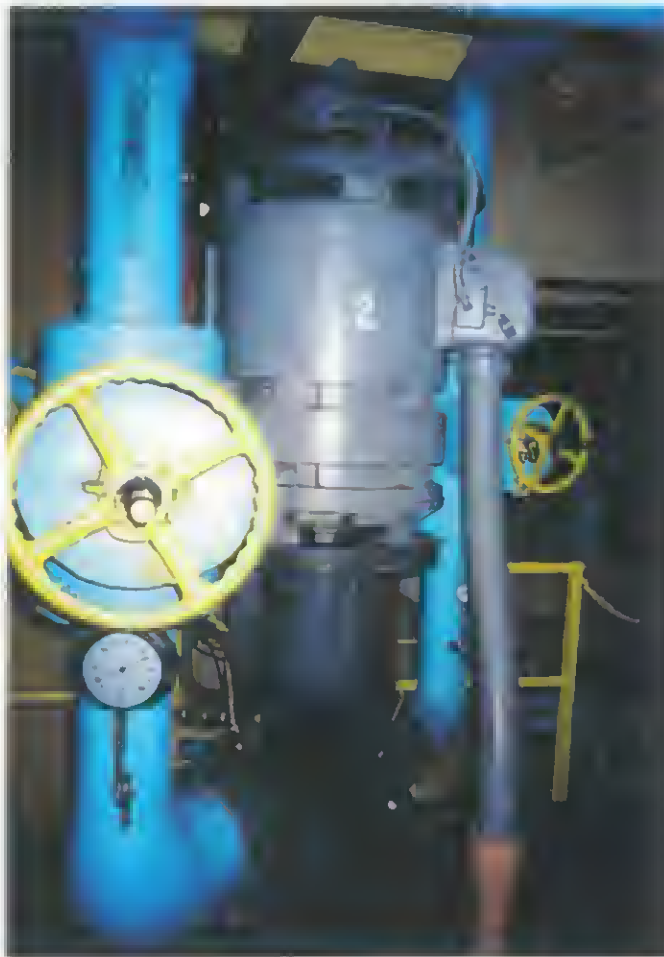
X



**Photograph M8**

Domestic water  
pressure  
reducing station





Photograph M9

Domestic water  
booster pump

X



Photograph M10

Domestic water  
preheat tank





**Photograph M11**

Steam and  
electric domestic  
water heaters  
and circulating  
pumps

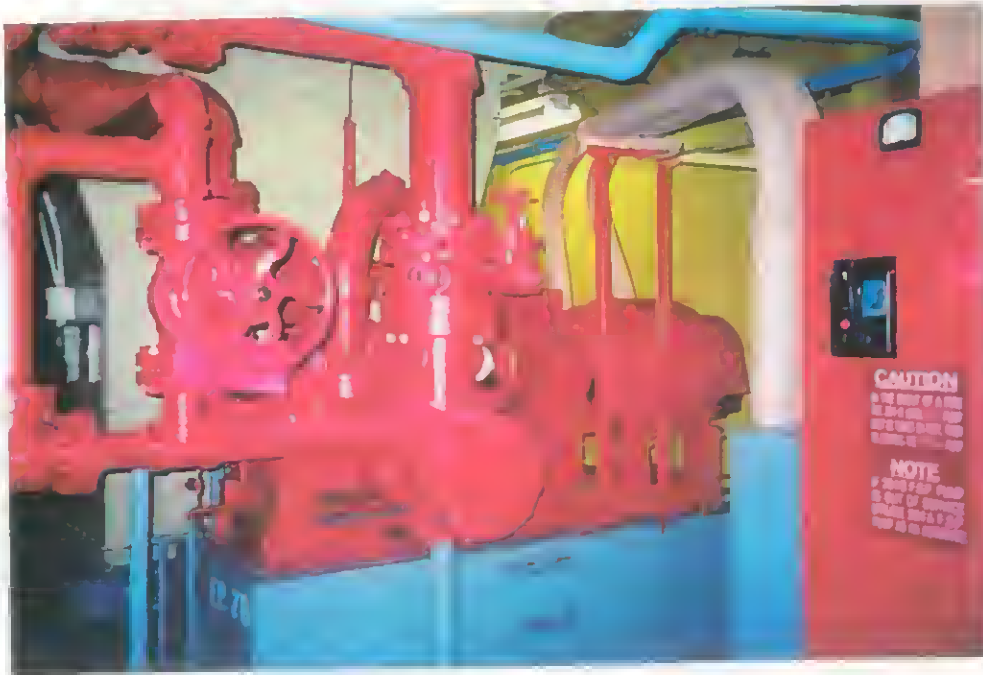
X



**Photograph 12**

Large electric  
water heater





**Photograph M13**

**Electric fire pump located in the 7th floor mechanical room**

X



**Photograph M14**

**Standpipe riser with a fire hose rack and fire extinguisher cabinet located in the stairs**







Photograph M15

Fire alarm  
panels for the  
new system being  
installed

X



Photograph M16

Duct smoke  
detectors for a  
typical air  
handler



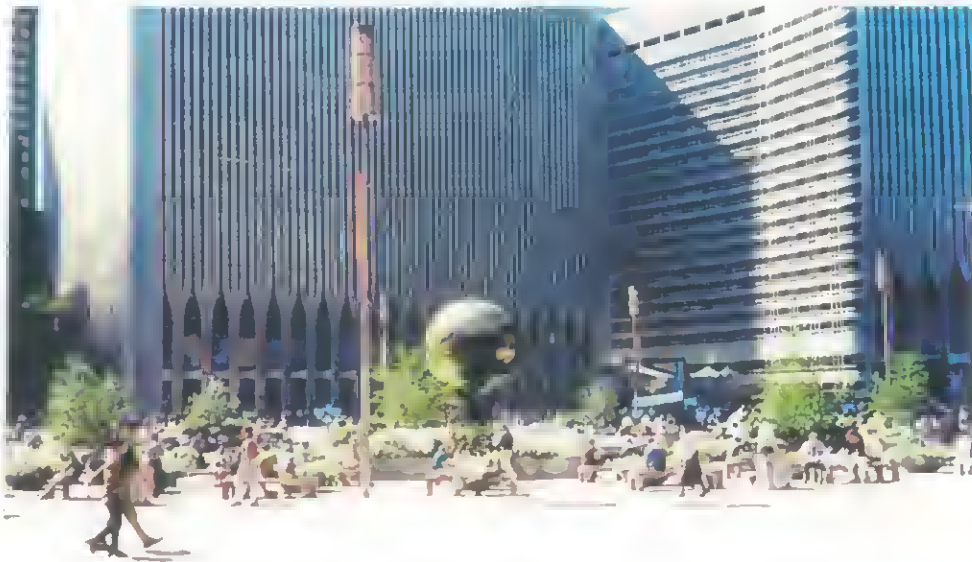


Photograph M17

Exit sign, manual  
pull station, and  
alarm

X





Photograph 1

Austin Tobin  
Plaza looking  
southwest

X



Photograph 2

Sidewalk, curb,  
and planter  
details on  
sidewalk looking  
west along Vesey  
Street

92

92



**Photograph 3**

**Sidewalk  
conditions along  
Vesey Street near  
West Broadway**

X



**Photograph 4**

**Sidewalk  
replacement in  
progress West  
Street near  
Customs House**



Photograph 5

Vehicular drop  
off at entrance to  
1 WTC on West  
Street

X



Photograph 6

Typical granite  
stairway from  
Plaza between  
WTC 1 and hotel







**Photograph 7**

Street furniture  
and pavement  
south of WTC 2  
along Liberty  
Street

X



**Photograph 8**

New granite  
pavement south  
at 2 WTC  
entrance





Photograph 9

Sidewalk and  
steps south of 4  
WTC at Liberty  
and Church  
Street

X



Photograph 10

Street furniture,  
planters, and  
tree wells along  
Church Street at  
4 WTC

88

88



Photograph 11

Ramped  
entrance from  
Church Street  
looking west into  
Tobin Plaza

X



Photograph 12

Church Street  
steps entering  
Plaza

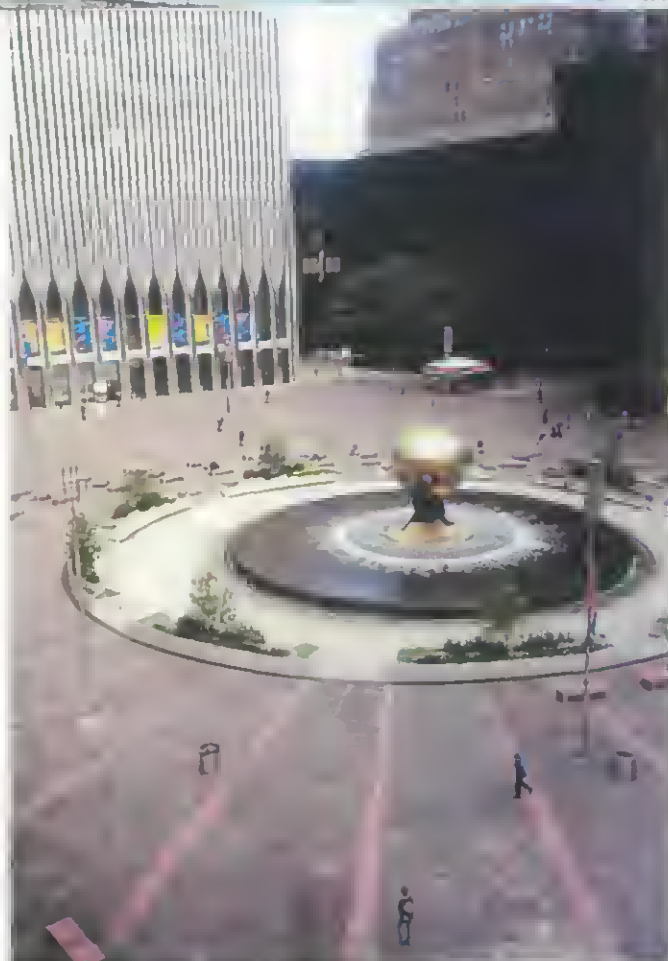




Photograph 13

Sculpture at  
entrance to Plaza  
on Church Street

X



Photograph 14

Overview of  
Plaza from  
4WTC







Photograph 15

Damaged Plaza  
pavement under  
overhang for 4  
WTC

X



Photograph 16

Planter damage  
at Plaza level  
near 4 WTC

85

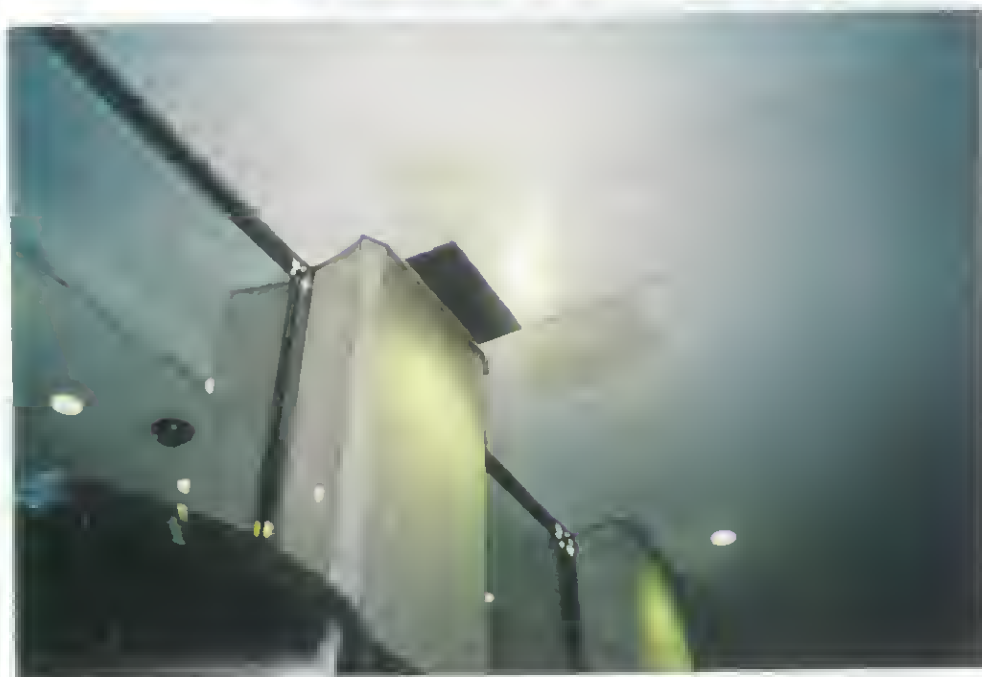
85



Photograph 17

Expansion joint  
in Plaza deck  
along east side  
near Church  
Street

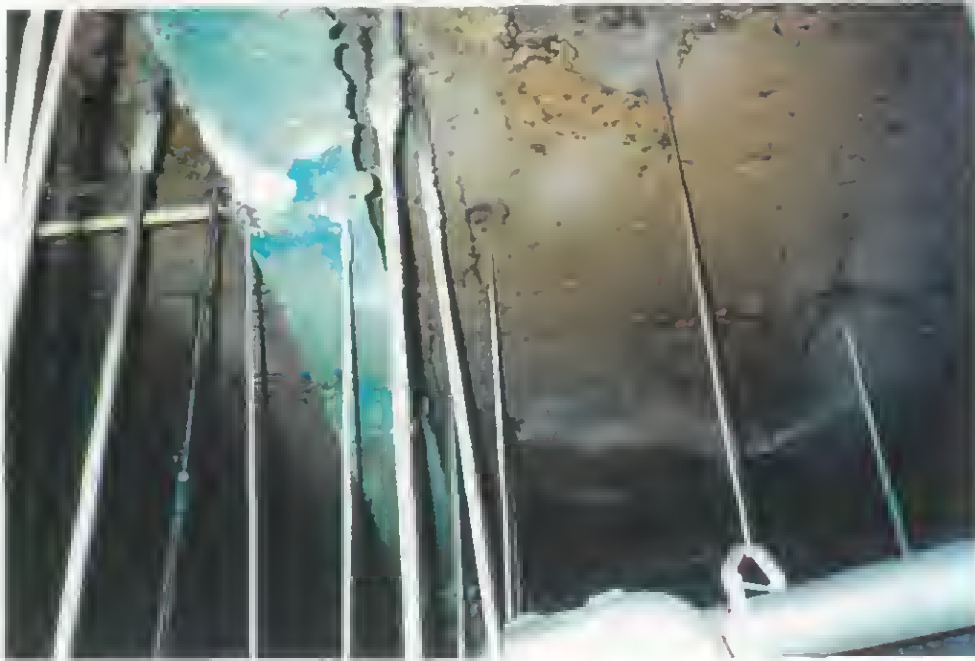
X



Photograph 18

Leaks at  
underside of  
Plaza deck  
visible near 1  
WTC entrance

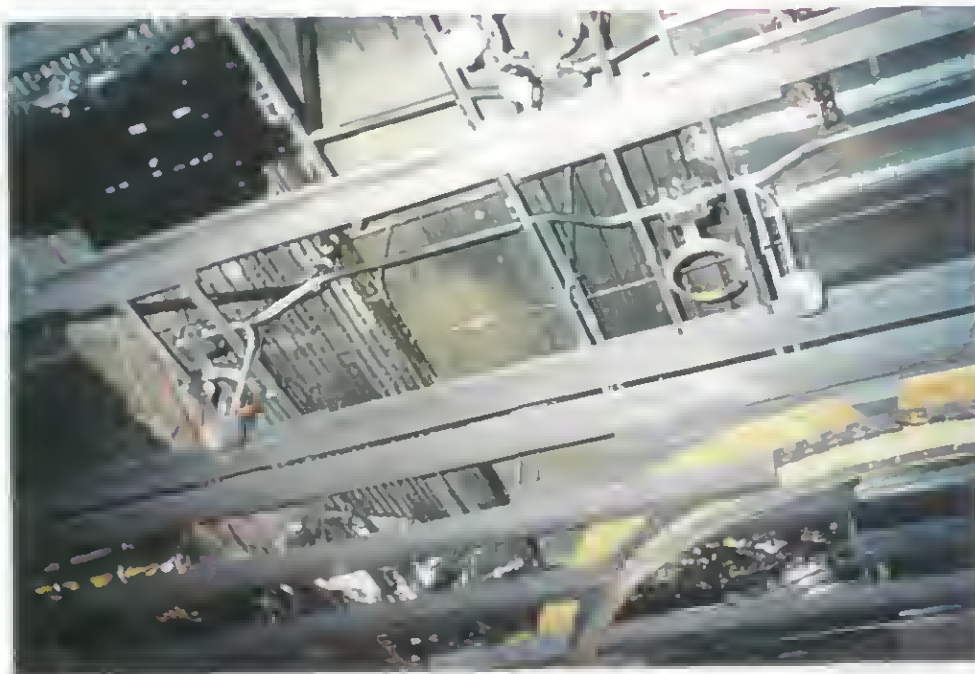




**Photograph 19**

Structure of  
Concourse level  
visible from 4  
WTC mechanical  
room on B1 level

X



**Photograph 20**

Metal deck and  
framing for  
Plaza level  
visible from  
construction  
area in  
Concourse level





**Photograph 21**

Steel framing  
and metal deck  
for 3rd Floor  
framing visible  
in vacant retail  
space at 4WTC  
Plaza level

X



**Photograph 22**

Exterior finishes  
and space under  
overhang being  
used for  
restaurant  
seating



82

82



**Photograph 23**

Detail of exterior  
structure and  
finishes at 5  
WTC

X



**Photograph 24**

Doors to  
northeast  
building  
entrance occur  
on a level  
between the  
Concourse and  
the Plaza





**Photograph 25**

Mall entrance  
detail along  
Vesey Street –  
Note exterior  
escalators to  
Plaza level on the  
right

X



**Photograph 26**

Retail showcase  
windows at  
Liberty Street  
side

80

80



**Photograph 27**

**Example of  
displaced marble  
panels to be  
monitored for  
further  
movement**

X



**Photograph 28**

**Damaged marble  
panel near  
bottom of  
exterior stairway  
between 1 and 4  
WTC**





**Photograph 29**

Central area of  
Concourse level  
at head of PATH  
escalators

X



**Photograph 30**

Old travertine  
flooring in an  
area scheduled to  
be replaced with  
terrazzo







**Photograph 31**

New terrazzo flooring in the north Concourse corridor looking west towards 1 WTC

X



**Photograph 32**

New terrazzo flooring in west corridor looking south towards 2 WTC





**Photograph 33**

South corridor  
with original  
finishes looking  
east from 1 WTC

X



**Photograph 34**

Intersection of  
south and east  
corridors with  
original finishes





**Photograph 35**

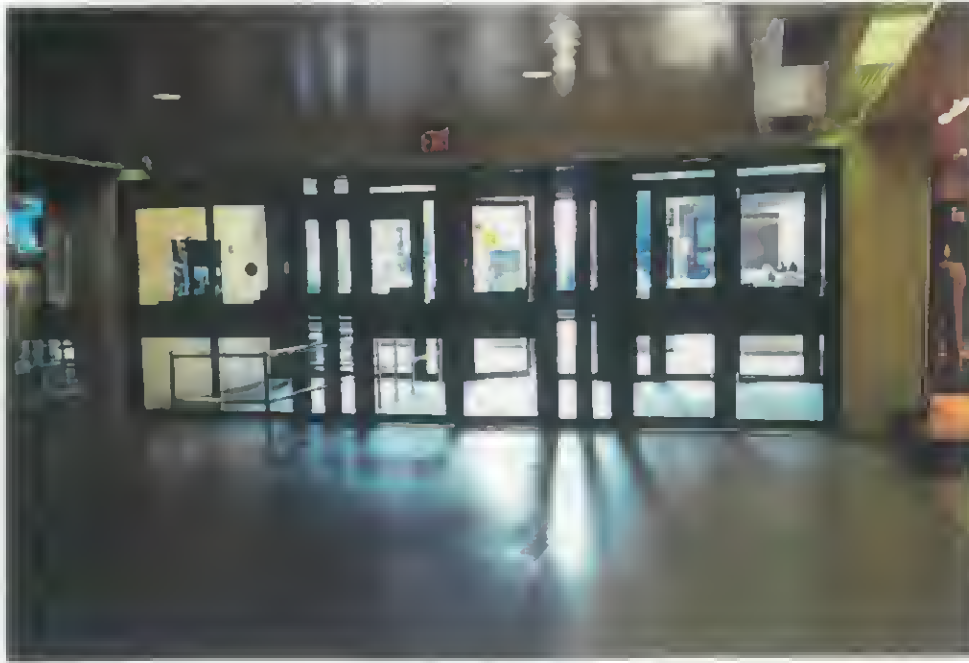
Central corridor  
looking north  
towards PATH  
entrance area

X



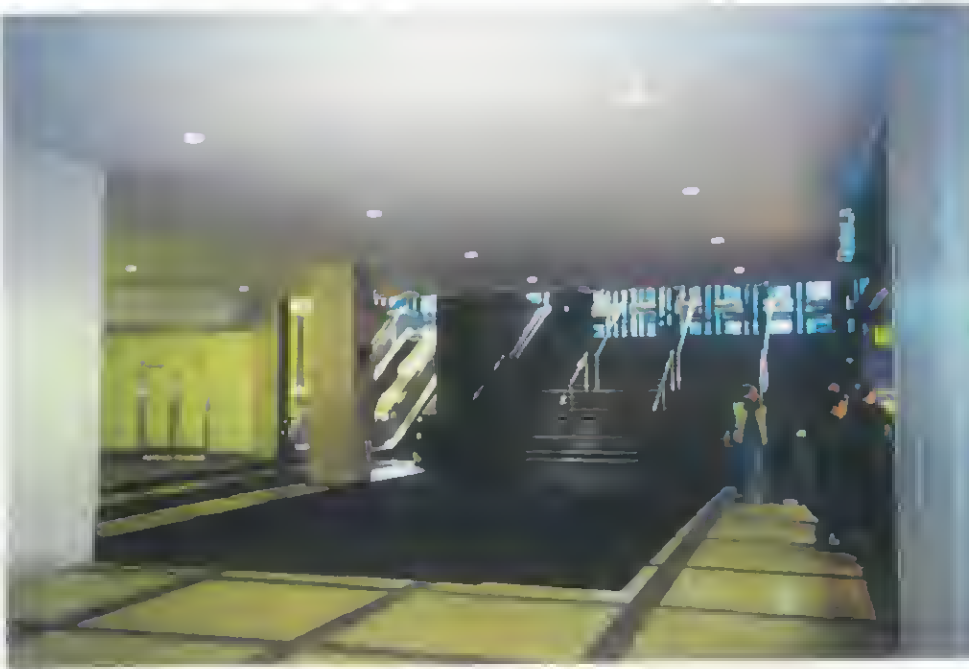
**Photograph 36**

Central corridor  
looking south  
toward Liberty  
Street entrance



**Photograph 37**

**Detail of Liberty  
Street entrance  
doors with ADA  
features on left**



**Photograph 38**

**Stairway and  
escalators at  
southeast  
building  
entrance**

74

74





**Photograph 39**

Lobby to 4 WTC  
at Concourse  
level is from the  
retail mall area

X



**Photograph 40**

East corridor  
looking north





**Photograph 41**

Central corridor  
looking west

X

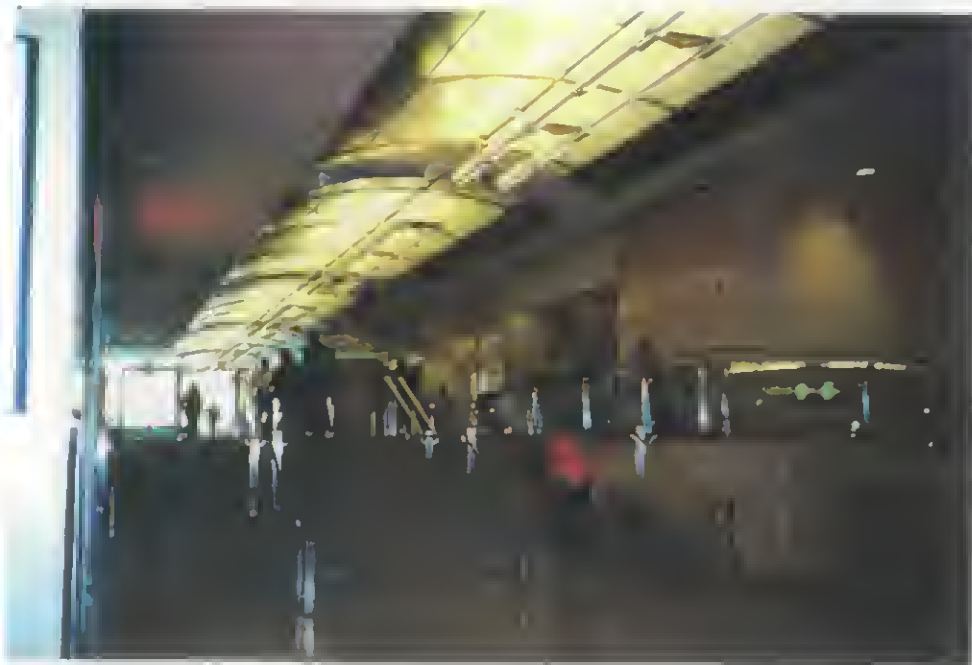


**Photograph 42**

North corridor  
looking east

72

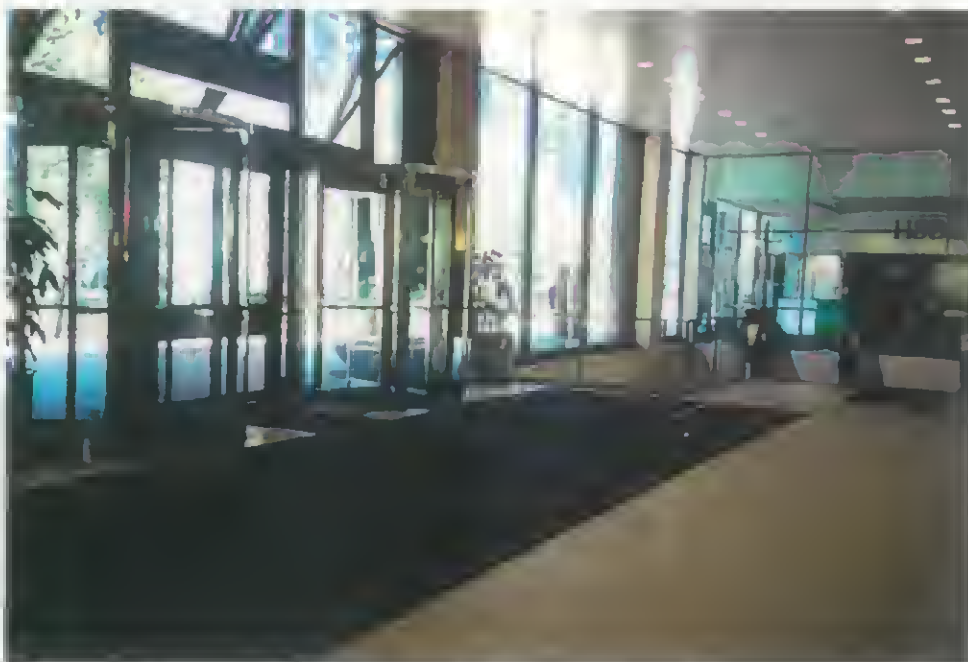
72



**Photograph 43**

5 WTC lobby is  
accessed by  
stairway and  
ADA ramp from  
mall at  
Concourse level

X



**Photograph 44**

Grade level  
entrance at  
northwest corner  
of complex  
occurs between  
Plaza and  
Concourse levels  
below the 5 WTC  
building





Photograph 45

Entrance from  
Plaza side at 5  
WTC

X



Photograph 46

Entrance to NYC  
subway system  
from eastern  
corridor

70

70





**Photograph 47**

**Vacant retail  
space at Plaza  
level below 4  
WTC**

X



**Photograph 48**

**Change in level  
in retail space  
Plaza level below  
4 WTC**





**Photograph 49**

Rear service  
corridor at  
Concourse level  
east side

X



**Photograph 50**

Elevator lobby at  
4 WTC 3rd Floor

68

68



Photograph 1

Entrance pylon  
at Church Street  
Plaza entry

X



Photograph 2

Existing  
structure below  
building at B-2  
level remaining  
from PATH  
station



**Photograph 3**

Typical building structure with 30' column bays, cantilever at perimeter, steel framing and metal deck

X



**Photograph 4**

Spray applied fireproofing at framing

66

66



**Photograph 5**

**Double girder  
used on either  
side of column to  
frame cantilever**

X



**Photograph 6**

**Framing of  
cantilever below  
4th floor deck**



65

65



Photograph 7

Aluminum  
cladding conceals  
steel truss to  
support  
cantilever at 4th  
floor overhang

X



Photograph 8

East and north  
elevations





**Photograph 9**

North and west  
elevations from  
roof of 5WTC

X



**Photograph 10**

Supplementary  
stair tower  
added in 1995-96  
to serve trading  
room on 8th  
floor





Photograph 11

West and south  
elevations

X



Photograph 12

South and east  
elevations





**Photograph 13**

Detail of sill  
condition at 4th  
floor where  
painted finish is  
failing

×



**Photograph 14**

Roof layout  
overview from  
tower







**Photograph 15**

Main field of roof with mechanical penthouse, window washing rig track and parapets visible

X



**Photograph 16**

Southeast stairway exiting into well at roof partially blocked by debris





**Photograph 17**

Concourse level  
elevator lobby

X



**Photograph 18**

Main entrance at  
Plaza level from  
Church Street.  
Escalator at  
right connects to  
Concourse level





Photograph 19

Plaza level  
elevator lobby

X



Photograph 20

Typical office  
floor elevator  
lobby

58

58



**Photograph 21**

**Office floor  
corridor finishes**

X



**Photograph 22**

**Office space  
along window  
wall**







**Photograph 23**

**Representative  
office space**

X



**Photograph 24**

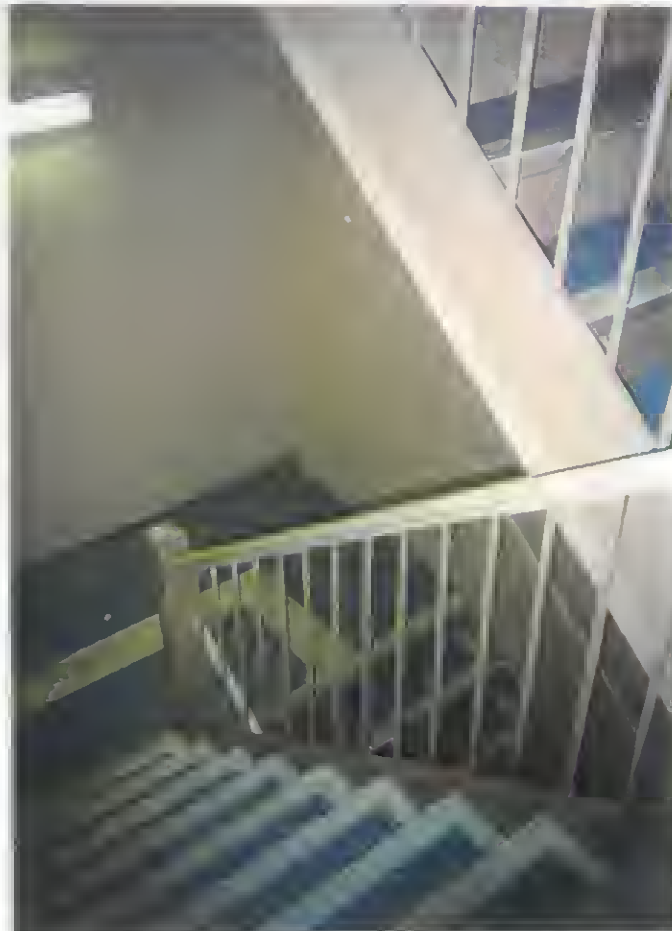
**Typical rest  
room finishes**





Photograph 25

Typical rest  
room finishes



Photograph 26

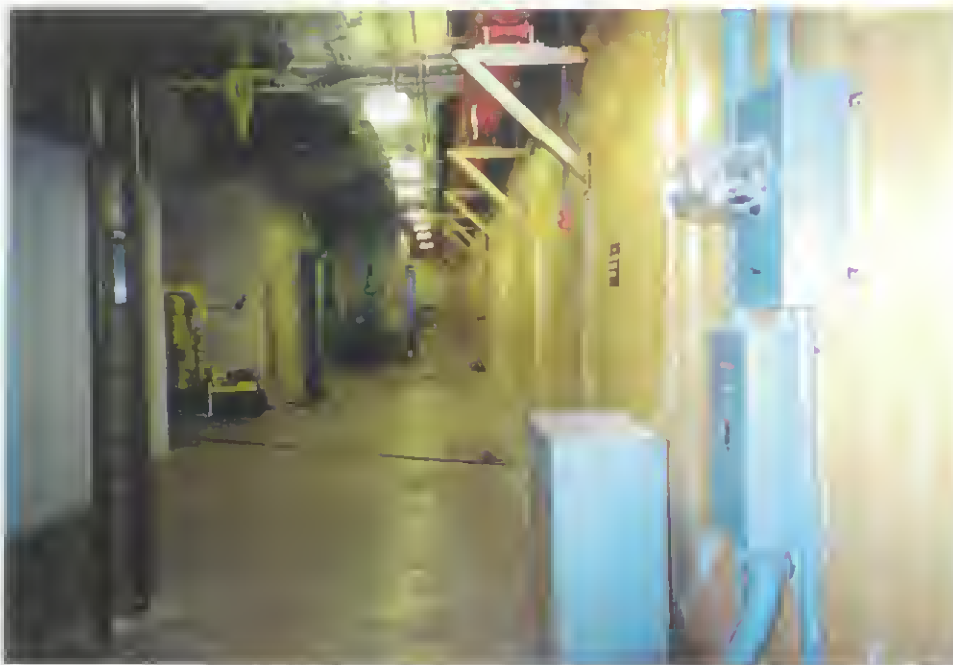
Stairway finishes



Photograph 27

Mechanical  
equipment room  
finishes on 9th  
floor

X



Photograph 28

Mechanical  
equipment room  
finishes on 9th  
floor





**Photograph M1**

Typical perimeter  
induction unit with  
a chilled/hot water  
coil

X

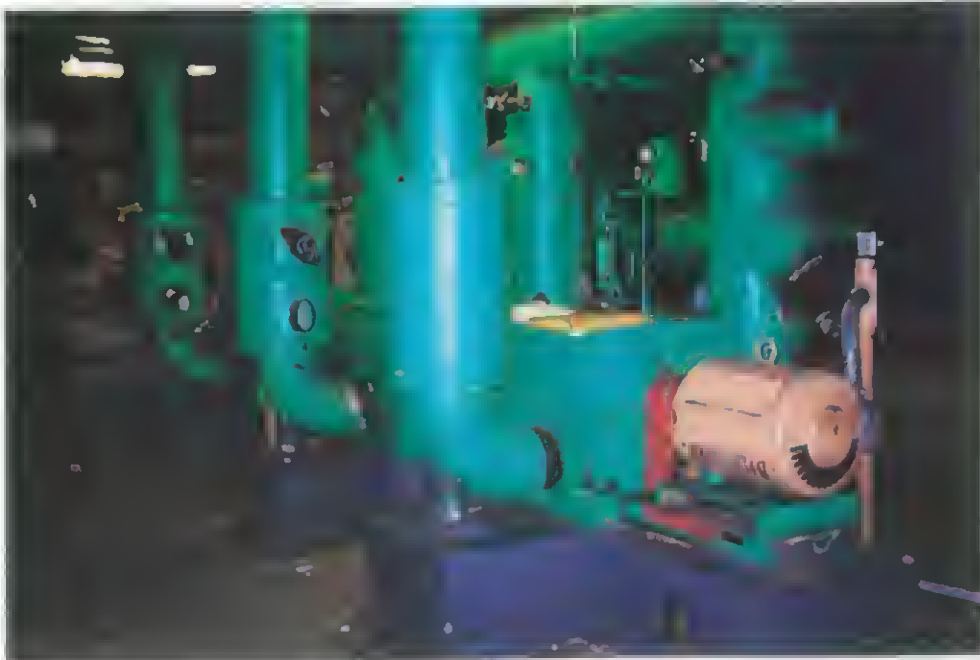


**Photograph M2**

Air handling unit  
located in the  
3rd floor  
mechanical room







Photograph M3

Chilled water  
pumps located in  
the B1  
mechanical room

X



Photograph M4

Plate and frame  
heat exchangers  
for chilled water  
located in the B1  
mechanical room





Photograph M5

Condenser water  
supply and  
return lines for  
tenant  
supplementary  
air conditioning

X



Photograph M6

Heat exchanger  
and circulating  
pump for heating  
hot water



**Photograph M7**

**Ejectors and  
tanks located in  
the B1  
mechanical room**

X



**Photograph M8**

**Steam domestic  
water heaters  
with circulating  
pumps**

50

50



**Photograph M9**

Electric circuit  
breaker panels in  
a typical electric  
closet

X



**Photograph M10**

Typical elevator  
lobby without a  
wall plaque  
showing the  
location of exit  
stairs to be used  
in the event of a  
fire





Photograph M11

Booster fire  
pump located in  
the 9th floor  
mechanical room

X



Photograph M12

Variable  
frequency drive  
controllers for  
the air handler  
supply fans in  
the 3rd floor  
mechanical room



48

48



Photograph 1

Entrance pylon  
at Church Street  
Plaza entry



Photograph 2

Existing  
structure at 8th  
floor below the  
MER. Spray-  
applied  
fireproofing and  
rigid panel sound  
insulation are  
visible



Photograph 3

Roof deck  
structure with  
lally-column  
supports of  
exterior wall  
visible at 9th  
Floor MER

X



Photograph 4

Roof deck visible  
at 9th Floor  
MER Customs  
House

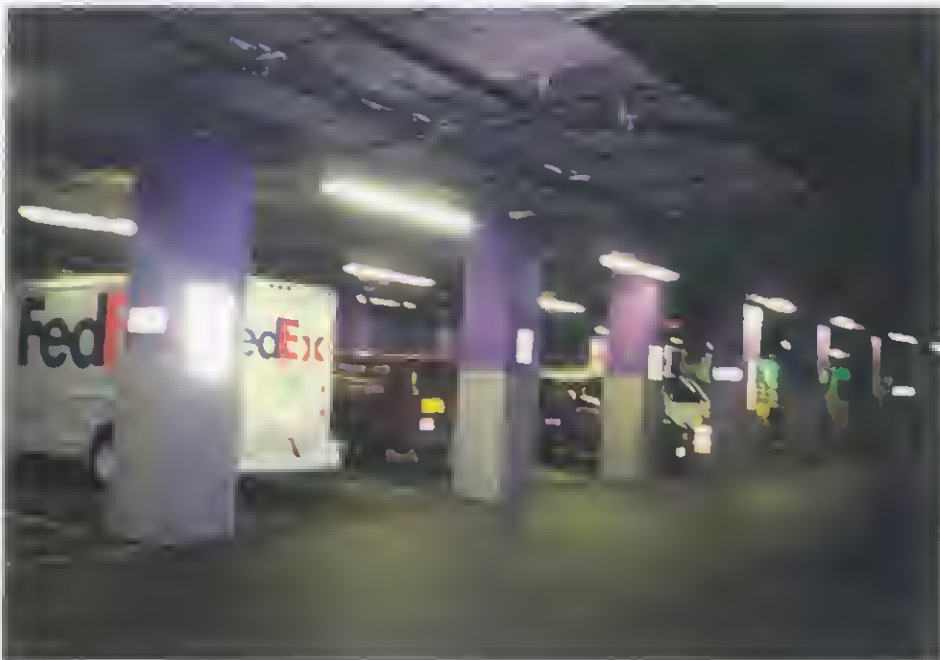
HG 46



**Photograph 5**

Example of spray  
applied  
fireproofing  
removed at  
framing for  
attachment of  
equipment

X



**Photograph 6**

Structure of B1  
Level at loading  
docks which also  
services 4WTC



Photograph 7

East elevation

X



Photograph 8

Northeast corner  
from Church  
and Vesey  
Streets







Photograph 9

North elevation

X

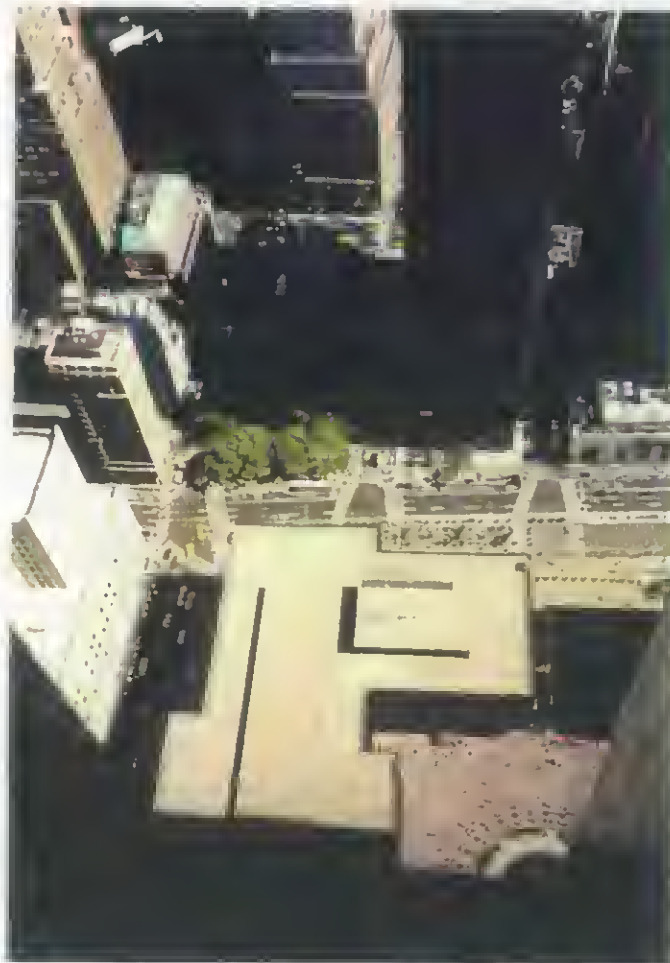


Photograph 10

South and west  
elevations from  
roof of 4WTC







**Photograph 11**

**Roof layout  
overview from  
tower**

X



**Photograph 12**

**Main field of  
roof with  
mechanical  
penthouse,  
window washing  
rig track and  
parapets visible**

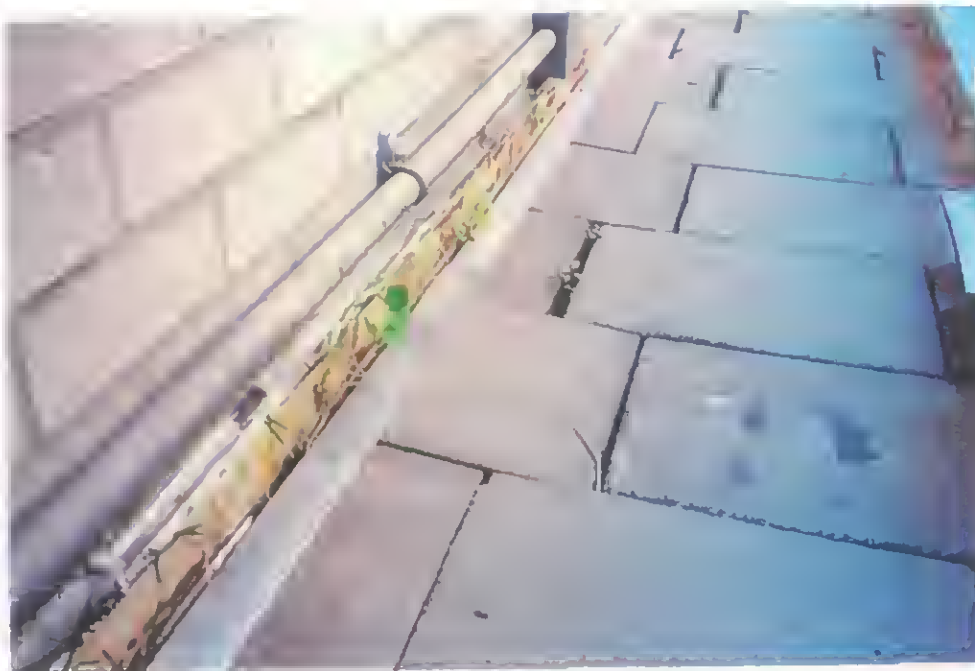
42

42



**Photograph 13**

Detail of roof  
drain with  
vegetation  
growth  
supported by the  
moisture held in  
paver backing



**Photograph 14**

Detail of  
perimeter  
flashing detail  
with vegetation  
growth





**Photograph 15**

**Penthouse roof  
with pavers  
removed for  
patching of  
membrane**

X



**Photograph 16**

**Severely rusted  
underside of roof  
deck from  
previous roof  
leaks**





**Photograph 17**

Concourse level  
stair and ramp  
entrance from  
retail mall

X



**Photograph 18**

Concourse level  
entrance







**Photograph 19**

**Plaza level lobby**

X



**Photograph 20**

**Office floor  
corridor finishes**





Photograph 21

Office space  
along window  
wall

X



Photograph 22

Representative  
office space

37

37



Photograph 23

Typical rest  
room finishes

X



Photograph 24

Typical rest  
room finishes

36

36



Photograph 25

Stairway finishes

X



Photograph 26

Mechanical  
equipment room  
finishes on 9th  
floor



35

35



Photograph 27

Freight elevator  
lobby finishes on  
9th floor

X



Photograph 28

Stored debris  
blocking  
corridor on B1  
level





**Photograph M1**

Typical air  
handling unit  
located in the  
9th floor  
mechanical  
room

X



**Photograph M2**

Chilled water  
supply line from  
the central plant





Photograph M3

Typical return  
air fan located in  
the 9th floor  
mechanical room

X



Photograph M4

Steam pressure  
reducing station





Photograph M5

Secondary  
chilled/heating  
hot water pumps  
located in the 9th  
floor mechanical  
room

X



Photograph M6

Heat exchangers  
and circulating  
pumps for  
heating hot  
water system







Photograph M7

Steam  
condensate  
pumps and  
receiver

X



Photograph M8

Domestic water  
supply pumps

30

30



Photograph M9

Ejector pumps  
and tank

X



Photograph M10

Steam domestic  
water heaters  
and circulating  
pumps





Photograph M11

Standpipe riser  
with sprinkler  
supply, and flow  
and tamper  
switches

X



Photograph M12

Typical office  
floor corridor  
with exit sign,  
manual pull  
station,  
audio/visual  
alarm, and fire  
warden station

28

28



Photograph 1

River water pumps  
in the remote  
pumping station

X



Photograph 2

Traveling screen  
filter for the  
river water  
system







Photograph 3

River water  
piping within the  
complex

X



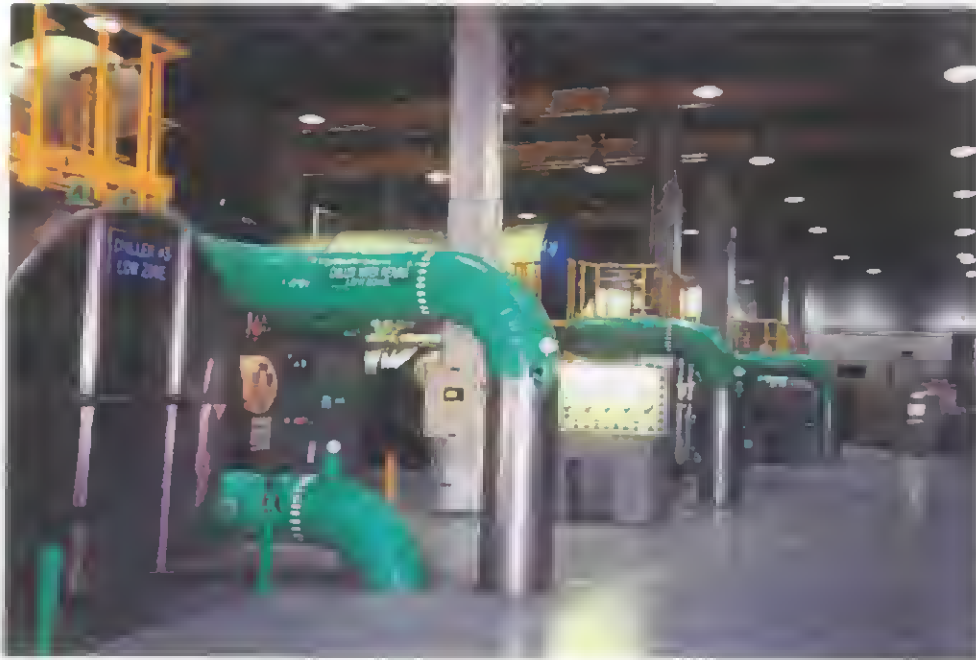
Photograph 4

River water  
strainers for the  
closed loop  
condenser water  
systems



Photograph 5

Main chiller #3



Photograph 6

Main chiller # 7  
(split for high  
and low zone)



25

25



Photograph 7

Chilled water  
pumps

X



Photograph 8

High and low  
zone chilled  
water piping





Photograph 9

Supplemental  
chillers

X



Photograph 10

Refrigerant  
storage tanks







Photograph 11

Heat exchanger  
for economizer  
operation

X



Photograph 12

Pneumatic  
control air  
compressors





Photograph 13

Steam pipe rack

X



Photograph 14

Steam service  
valve (planned  
for replacement)

21

21



Photograph 15

Steam  
distribution  
plant

X

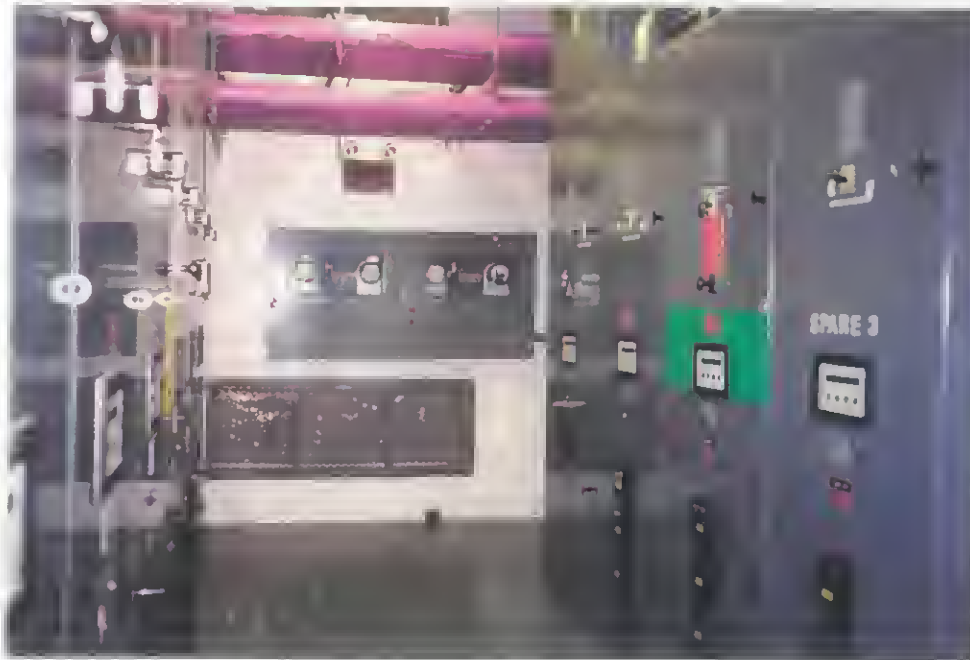


Photograph 16

One of the main  
water service  
meters

20

20



Photograph 17

Switchgear  
within the  
Primary  
Distribution  
Center

X



Photograph 18

Recently  
upgraded high  
voltage feeders







Photograph 19

Upgraded  
electrical  
substation



Photograph 20

Electrical  
distribution bus  
ducts (new and  
old) from a  
substation

18

18

Subgrade (Parking & Storage Areas)

World Trade Center  
New York, New York



Photograph 1

Slurry wall exposed  
in Level B5

X



Photograph 2

Base of slurry wall -  
Level B6





Photograph 3

Ceiling slab spalling at  
slurry wall

X



Photograph 4

Ventilation  
plenum typical -  
runs along north,  
east, and south  
walls of garages  
at Levels B2 - B4





Photograph 5

Leakage stains on  
slurry walls



Photograph 6

Stains on slurry  
wall and patches  
for leaks



15

15



Photograph 7

Spalling garage  
slab - Level 2, North

X



Photograph 8

Spalling slab in B5  
Central Plant





**Photograph 9**

New slab being installed in loading dock area - start of multi-stage program

X



**Photograph 10**

Loading dock area



Subgrade (Parking & Storage Areas)

World Trade Center  
New York, New York



Photograph 11

Loading dock area  
for US Customs  
Buildings

X



Photograph 12

Missing fireproofing  
at loading dock



Subgrade (Parking & Storage Areas)

World Trade Center  
New York, New York



**Photograph 13**

**Missing fireproofing  
at ventilation  
plenum - B2 North**



**Photograph 14**

**Missing fireproofing  
at B-2 Garage**



11

11



**Photograph 15**

Leased offices at  
former parking area  
(B1) for Marriott  
Hotel

X



**Photograph 16**

Repairs of ceiling  
slab at B2 ceiling  
due to bomb  
explosion

10

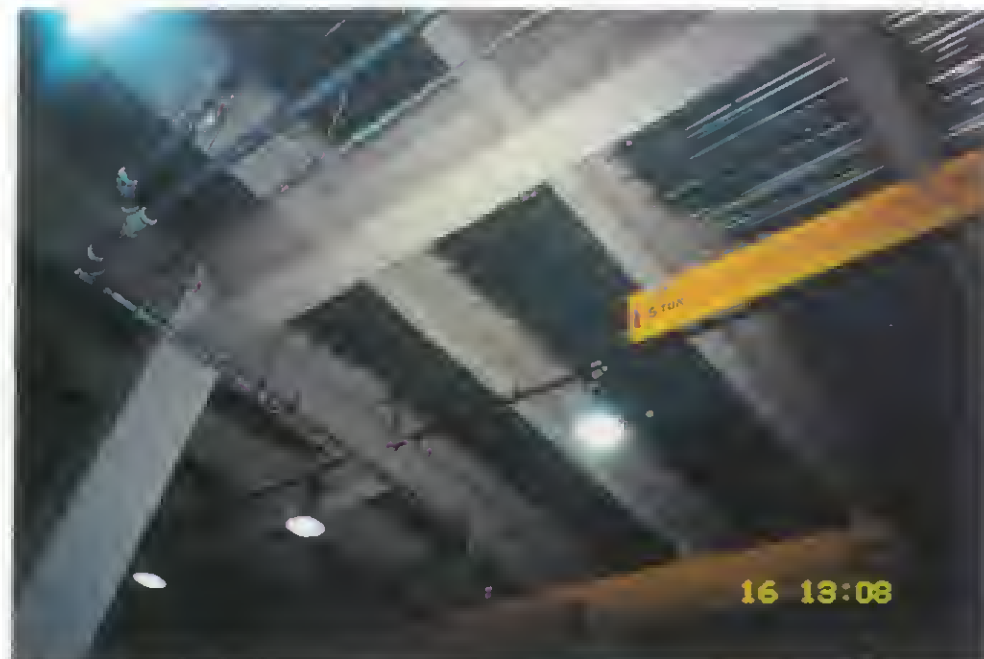
10



Photograph 17

Repairs at column  
brackets to support  
weakened slabs

X



Photograph 18

New ceiling slab  
installed above  
refrigeration plant  
due to bomb blast

9

9



Photograph 19

Ceiling under B4  
ramp (south) in  
ventilation plenum  
requires repairs



Photograph 20

Level B2 slab  
spalling (at ramp)

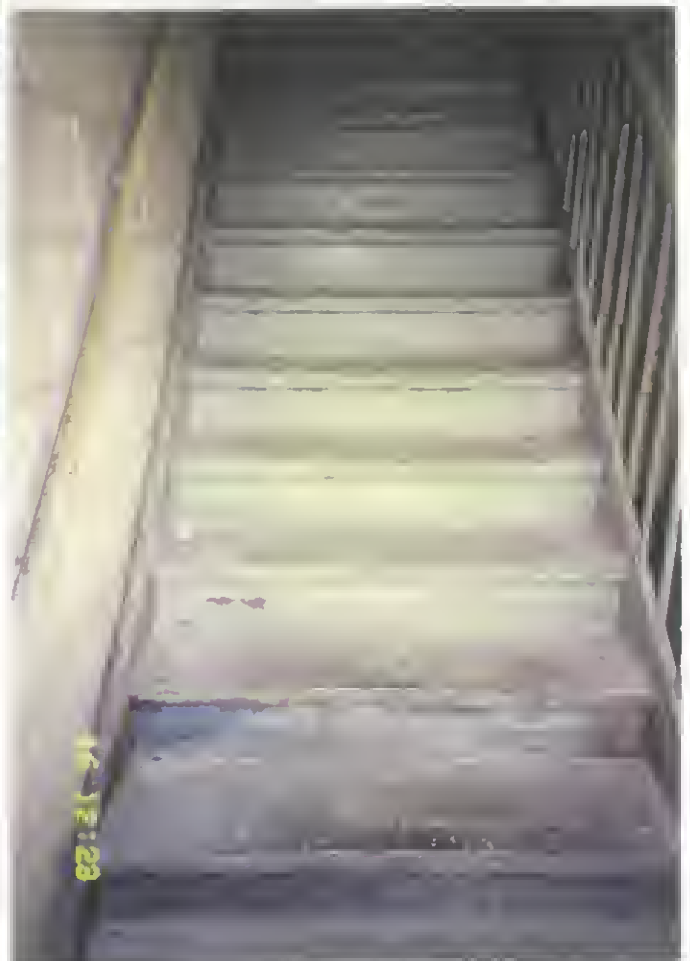
8

8



Photograph 21

Stair in projection  
serves as PATH  
emergency exit



Photograph 22

Typical subgrade  
stair requires  
cleaning and  
some require  
painting



7

7

Subgrade (Parking & Storage Areas)

World Trade Center  
New York, New York



Photograph 23

B5 and B6 storage  
spaces



Photograph 24

B4 northeast stair  
door being replaced

6

6

Subgrade (Parking & Storage Areas)

World Trade Center  
New York, New York



Photograph M1

Heating and  
ventilating unit in the  
loading dock area

X



Photograph M2

Window style air  
conditioning unit  
used in the parking  
office

5

5



Photograph M7

Tenant air-cooled  
condensers in the  
northwest projection  
area

X



Photograph M8

Tenant emergency  
generator in the  
northwest projection  
area

4

4



Photograph M9

Typical sewage  
ejector pit

X



Photograph M10

Pumps within an  
ejector pit



3

3



Photograph M11

House traps within  
subgrade space

X



Photograph M12

High voltage  
electrical duct banks  
painted purple  
within the subgrade  
space

2

2

Subgrade (Parking & Storage Areas)

World Trade Center  
New York, New York



Photograph M13

Life safety devices  
within a subgrade  
storage area

X



Photograph M14

Sprinkler head in  
the loading dock  
area observed to be  
painted

